

Approval and Communication of Refinery, Maintenance, or Engineering Instructions

Document No.: RI-363	Title: Process Hazards Analysis	Current Date: 3/2008
Action: <input type="checkbox"/> New <input checked="" type="checkbox"/> Revision <input type="checkbox"/> Cancellation		Next Revision Due: 3/2013
Responsible Organization: HES		Position to Contact With Questions/Suggestions: PSM Coordinator, ext. 2-1862
Summarize Rewritten Material: 1. Additional Considerations are now referred to as Recommendations 2. Clarifications regarding Project PHA Recommendations: a) Recommendations shall be reviewed and approved by the Project Manager/delegate & the affected ABUM, b) Recommendations shall be tracked in the Refinery PHA Recommendation data base, and c) Plans shall be verified as implemented (prior to start-up as part of the PSSR Process). 3. Replace existing Appendix III with Chevron Integrated Risk Prioritization Matrix; Added Richmond ISO matrix. 4. New requirement to ensure P&ID's are checked for accuracy prior to performing a PHA revalidation.		

REQUIRED COMMUNICATION/TRAINING

If Type 2 or Type 3 training is necessary – Instruction Owner is responsible for developing the training material and must work with Development Department Manager and Managers of affected personnel to coordinate training of affected personnel and documentation of training.

This document should be reviewed by:	Type 1 Simple Change	Type 2 On-The-Job Training	Type 3 Classroom Training
All Refinery Personnel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operations	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Maintenance & Reliability	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HES	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: Major & Capital Project Managers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPROVALS

Instruction Owner: Matt Brennan	Development Manager: <i>(first signature before final routing)</i> Dean Van Bockern
Operations Manager: Jay Yeager	Technical Services Manager:
HES Manager: Tery Lizarraga	Maintenance & Reliability Manager:
Refinery Manager: <i>(final signature)</i> Mike Coyle	Other Manager:

On Completion – Instruction Owner will send file and message to IPC to post on the Refinery server.

Necessary Approval for Instructions:

- | | |
|---|---|
| <ul style="list-style-type: none"> • Refinery Instructions: • Safe Work Practices: • Emergency Plans (400 Series RIs): • Engineering Instructions: • Maintenance Instructions: • Cancellation of Instruction: | <ul style="list-style-type: none"> Development, Operations, HES, and Refinery Manager Development, Operations, Maintenance & Reliability, HES, and Refinery Manager Development, Operations, Maintenance & Reliability, HES, and Refinery Manager Technical and HES Manager Maintenance & Reliability and HES Manager RI Owner and Refinery or Operations Manager |
|---|---|

REVISED: 9/06

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RICHMOND REFINERY INSTRUCTION

SAFETY

PROCESS HAZARDS ANALYSIS

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RICHMOND REFINERY INSTRUCTION

SAFETY

PROCESS HAZARDS ANALYSIS

1.0 PURPOSE

The program detailed in this Instruction is intended to document and communicate the actions Chevron's Richmond Refinery will take to undertake and document a process hazard analyses to meet the following Corporate and regulatory requirements:

- 1.1 U.S. Federal EPA requirements of 40 CFR Part 68 – Prevention program elements for the Risk Management Plan (RMP)
- 1.2 U.S. Federal OSHA requirements of 29 CFR 1910.119 – Process Safety Management (PSM)
- 1.3 California Accidental Release Prevention (Cal/ARP) Program, Title 19, § 2760.2
- 1.4 California Office of Safety Health Administration (OSHA) Process Safety Management (PSM), Title 8, § 5189
- 1.5 City of Richmond, California Industrial Safety Ordinance 42-01
- 1.6 Chevron Corporation Operational Excellence Safe Operations, item 3.1

2.0 SCOPE

This Instruction addresses all Process Hazard Analyses (PHAs) performed for new and existing facilities in the Richmond Refinery.

*All PHA teams (including participating contractors) will be given all information necessary to adequately assess the hazards of the process including any trade secrets.

***2.1 Formal PHA**

A formal PHA is required for all new process units and for major changes. The PHA should be completed at the earliest point in the project after all major design decisions are made and the P&IDs are issued for construction. In all cases, the PHA and recommendations must be completed prior to start-up of a new or modified process unit and verified during the Pre-Startup Safety Review process. For changes to design after completion of the PHA, the MOC process will be used to amend the current PHA.

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2.2 Revalidations

The PSM regulation requires that initial PHAs are revalidated every five years. The date the previous PHA findings were formally communicated to the process owner is called the "Draft Date." The next PHA revalidation must be completed within five (5) years of that date.

3.0 PHA METHOD

3.1 Primary Methodologies (initial Plant PHA or "Major Change" PHA's)

There are three primary methodologies that can be employed to perform a PHA, depending on the type and complexity of the process under evaluation.

1. Hazard and Operability Assessment (HAZOP) PHA
2. What-if PHA and/or What-if/Checklist PHA
3. Procedural PHA

3.2 Methodology Details

The details regarding these methodologies are available in the PHA Leaders Manual, since they are specific procedures followed by the PHA Leader.

3.3 Methods Application

Refer to Appendix I for definitions and guidance in selecting the appropriate formal or supplemental PHA method.

4.0 DOCUMENTATION

4.1 PHA Reports

Standardized report formats have been developed to ensure quality and compliance with the various regulations. These are secured in the PHA Leader Manual. Completed PHA's are made available to the directly affected personnel on the Chevron Intranet. All completed PHA's must be retained for the life of the process.

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PROCESS HAZARDS ANALYSIS

*4.2 Initial PHA on New Construction Projects or Major Modifications

The Project Team Leader shall work with the Refinery PSM Coordinator to ensure all of the legal requirements of the PHA are understood and performed. The Project Team Leader will provide one electronic and one paper copy of the completed PHA and documentation to validate all recommendations have been implemented or resolved to the PSM Coordinator prior to start up of the new or modified facility.

*5.0 RECOMMENDATION – MANAGEMENT

*5.1 Resolution of Recommendations

1. Recommendations are potential unresolved risks or hazards identified by the team during the PHA. The business unit and project group (if applicable) must address and resolve each item the team has identified as a risk.
2. If a project PHA is performed, each recommendation shall be reviewed and endorsed by the project manager and Refinery Business Manager (RBM)/delegate that will be responsible for the operation of the new or modified facility.

*5.2 Recommendation Alternatives

The business unit or project team may not always agree with the PHA team's recommendations and may wish to reject a recommendation. Pending a PSM Group regulatory review, the business unit and/or project team may decline a team's recommendation by documenting one of the following:

1. The analyses upon which the recommendations are based contain factual errors.
2. An alternative measure would provide a sufficient level of protection.
3. The recommendation is not feasible.

Any revision to the original recommendation must be reviewed by the team and the amended recommendation filed in the original documentation by a PHA Facilitator and secured in the Refinery PHA database.

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*5.3 Recommendation Solutions

Utilizing the Chevron Integrated Risk Prioritization Matrix (Appendix III), any deviation Risk-Ranked 1, 2, 3, or 4 requires an Inherently Safer Solution (ISS). An ISS assessment must be performed by an engineer and reviewed by the RBM/delegate responsible for the operation of the unit. The RBM must then select and implement the highest ISS feasible. If concluded that an inherently safer solution is not feasible, the basis for this conclusion shall be documented in meaningful detail in the Refinery ISS database. Refer to the ISS Guidelines and Procedures web site.

*5.4 New Construction and/or Project PHAs

Recommendations issued by the PHA team must be resolved, completed, and documented in the Refinery PHA database prior to start-up of the change and meet the requirements defined in this section.

*5.5 PHA Recommendation Management Process

The hazards and suggestions to eliminate or reduce risk, developed by the team, will be reviewed with the appropriate RBU Representatives at the closeout meeting. One purpose of the closeout meeting is to formally deliver the team findings to management. The day this meeting takes place becomes the "PHA Draft Date": this date starts the compliance clock for resolution of the recommendations. Each recommendation shall have an owner and due date identified within 30 days of this meeting.

For all project PHAs the Project Manager/delegate and the impacted RBM/delegate shall agree to the recommendation closure plan.

Refer to the Recommendation Management Process Flow Chart Appendix II.

*5.6 Timing Requirements for Resolution of Recommendations

1. All recommendations not requiring a process shutdown shall be completed within one year after draft date of the PHA.
2. All recommendations requiring a process shutdown shall be completed during the first regularly scheduled turnaround of the applicable process unless the Refinery documents that such a schedule is infeasible. If a high risk item cannot be resolved prior to the next scheduled shutdown an interim risk reduction strategy should be implemented.

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3. Project recommendations shall be addressed/resolved prior to start-up of the new or modified facility.

*5.7 Additional Consideration Recommendation Status

Each recommendation (both project PHAs and existing plant revalidations) shall be reported and documented in the Refinery PHA database. As the status of each item changes, as it gets closer to completion, the status should be updated. The status of all recommendations are reported per Appendix II. Status should be recorded and reported as:

1. **New:** These are recommendations that have been generated during a PHA, but have not been formally delivered (during the PHA close-out meeting) to the business unit.
2. **In Progress:** The recommendation is accepted, owner assigned, and an action plan has been developed.
3. **Declined:** Refer to Section 5.2 for justification and documentation requirements.
4. **Pending S/D:** The resolution plan is in progress, but cannot be implemented until the next shutdown. Items in this category require the recommendation to appear on a S/D or turnaround schedule. Every effort must be made to ensure these items are not deferred. Items not completed or deferred must be communicated to the HES Manager.
5. **Complete:** All action has been taken and the recommendation is fully implemented and documentation to support the completion has been completed in the PHA data base.

*5.8 Verification of Completion

Each recommendation that has been completed will be field verified to ensure the action has been implemented as prescribed. The person assigned this task should also verify the documentation requirements of the PHA data base for recommendations that have been completed or declined, have been addressed.

*5.9 PHA Recommendation Documentation

For all PHA revalidations, the RBU is responsible to complete recommendations identified during the PHA. Documentation must include the following:

1. The decision made to implement or not implement each recommendation generated during the PHA. (Refer to Section 8.4.)

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2. If the team's proposed recommendation will or will not be implemented. If not implemented, document what action the Project Area or RBU will take to address the recommendation (how management plans to eliminate the hazard or reduce the risk).
3. The results of recommendations for additional study.
4. Whether the action requires a shutdown to implement.
5. Recommendation owner and work group responsible for completing the item.
6. For all recommendations not selected for implementation, include the justification for not implementing the recommended action.
7. Retain documentation of closure and any associated justifications of actions identified by the process hazard analysis.

6.0 COMMUNICATION OF FINDINGS

- *6.1 After completion of the PHA and action plan for each recommendation has been determined/completed, a final report shall be issued.
- *6.2 During the close-out meeting of the PHA, the RBU RBM/delegate shall identify who within their organization are affected by the results of the PHA. Affected is defined as operating, maintenance, and other employees whose work assignments are in the process and who may be directly affected by the team findings.

Within 30 days of the close-out meeting, the PSM Coordinator/delegate shall ensure Active Learner tasks are developed for each person identified such that they are notified of the following:

1. The findings (concerns that were risk ranked and assigned as recommendation).
 2. The plan to resolve each recommendation.
 3. Expected completion date of each recommendation.
 4. Communicate where the entire report may be found.
- *6.3 A PHA business unit representative will solicit feedback from the affected individuals to verify the communications took place and were effective.

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PROCESS HAZARDS ANALYSIS

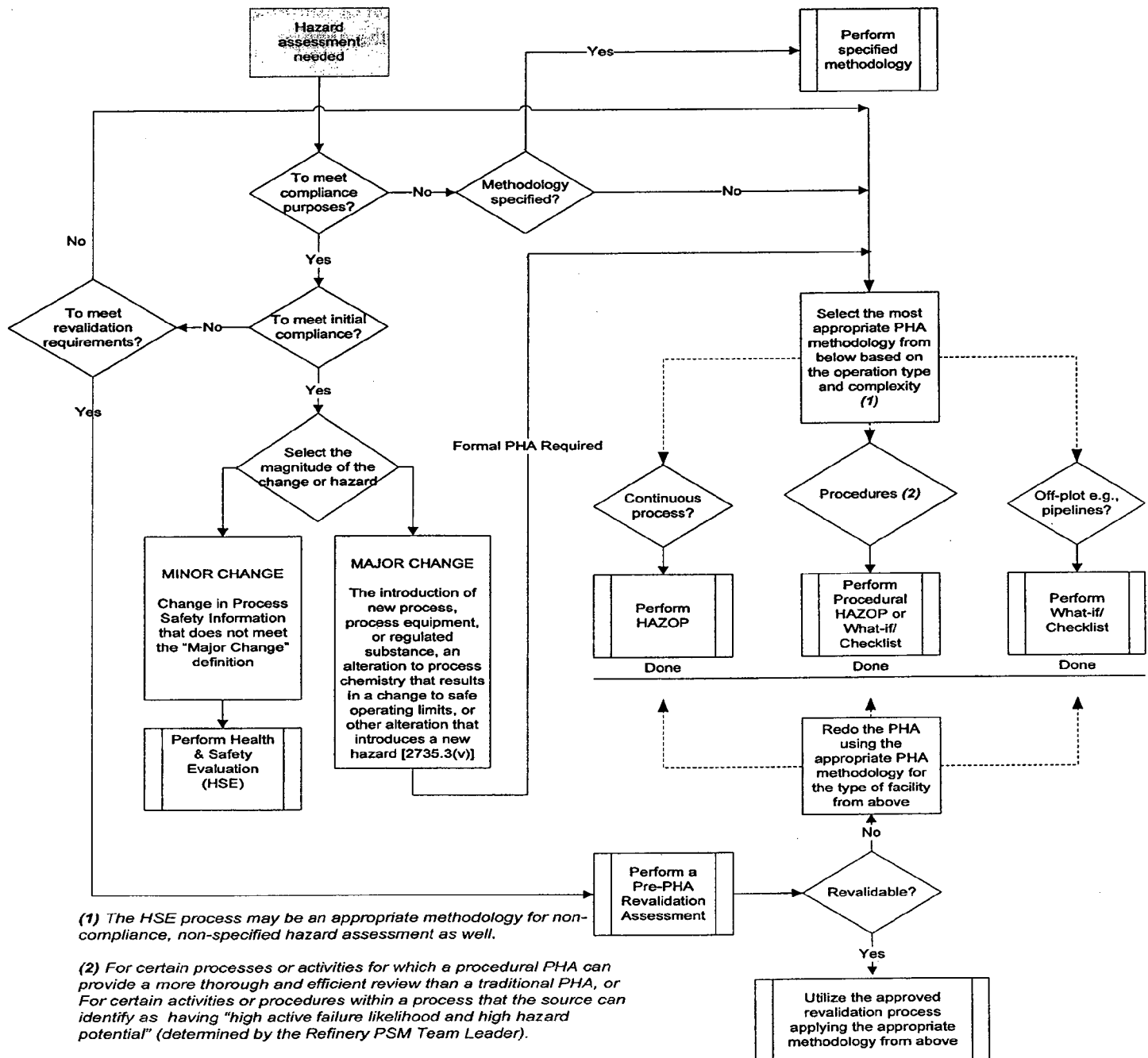
- *6.4 Project PHA recommendations and resolution plans do not need to be shared with the affected personnel since all changes resulting from the PHA shall be addressed or resolved prior to start-up of the new or modified facility. If changes to the existing field equipment occur and communication or training is warranted, such training will be identified in the MOC process for the change.

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APPENDIX I PROCESS HAZARDS ANALYSIS

RISK ASSESSMENT METHODOLOGY GUIDANCE

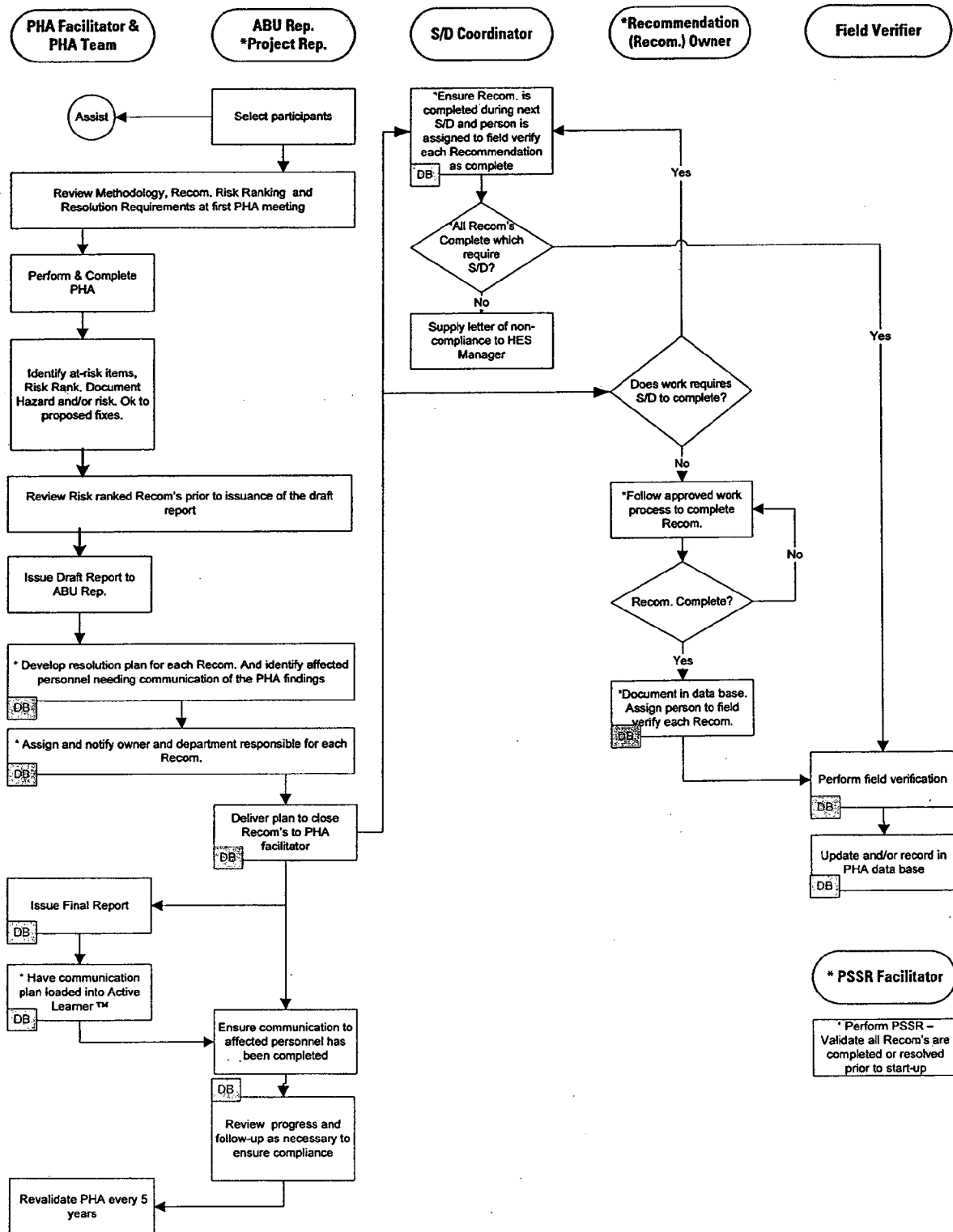


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APPENDIX II PROCESS HAZARDS ANALYSIS

RECOMMENDATION RESOLUTION PROCESS



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Likelihood Indices	Decreasing Likelihood					
	6	5	4	3	2	1
1	6	5	4	3	2	1
2	7	6	5	4	3	2
3	8	7	6	5	4	3
4	9	8	7	6	5	4
5	10	9	8	7	6	5
6	10	10	9	8	7	6

Consequence Indices	Decreasing Consequence/Impact					
	6	5	4	3	2	1
Consequence Descriptions	Incidental	Minor	Moderate	Major	Severe	Catastrophic
	Workforce: Minor injury such as a first-aid. AND Public: No impact	Workforce: One or more injuries, not severe. OR Public: One or more minor injuries such as a first-aid.	Workforce: One or more severe injuries including permanently disabling injuries. OR Public: One or more injuries, not severe.	Workforce: (1-4) Fatalities OR Public: One or more severe injuries including permanently disabling injuries.	Workforce: Multiple fatalities (5-50) OR Public: multiple fatalities (1-10)	Workforce: Multiple fatalities (>50) OR Public: multiple fatalities (>10)
	Workforce: Minor illness or effect with limited or no impacts on ability to function and treatment is very limited or not necessary. AND Public: No impact	Workforce: Mild to moderate illness or effect with some treatment and/or functional impairment but is medically manageable. OR Public: Illness or adverse effect with limited or no impacts on ability to function and medical treatment is limited or not necessary.	Workforce: Serious illness or severe adverse health effect requiring a high level of medical treatment or management. OR Public: Illness or adverse effects with mild to moderate functional impairment requiring medical treatment.	Workforce: (1-4): Serious illness or chronic exposure resulting in fatality or significant life shortening effects. OR Public: Serious illness or severe adverse health effect requiring a high level of medical treatment or management.	Workforce: (5-50): Serious illness or chronic exposure resulting in fatality or significant life shortening effects. OR Public: (1-10): Serious illness or chronic exposure resulting in fatality or significant life shortening effects.	Workforce (>50): Serious illness or chronic exposure resulting in fatality or significant life shortening effects. OR Public (>10): Serious illness or chronic exposure resulting in fatality or significant life shortening effects.
	Impacts such as localized or short-term effects on habitat, species or environmental media.	Impacts such as localized, long-term degradation of sensitive habitat or widespread, short-term impacts to habitat, species or environmental media.	Impacts such as localized, but irreversible habitat loss or widespread, long-term effects on habitat, species or environmental media.	Impacts such as significant, widespread and persistent changes in habitat, species or environmental media (e.g. widespread habitat degradation).	Impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.	Loss of a significant of a valued species of effective ecosystem function on a landscape scale.

The above legend applies only to HES risks, where risk levels 1-6 are actionable and mandatory.

For risks that may result in facility damage, business interruption, loss of product, the "Assets" category below should be used. Action is at the discretion of management. Under no circumstances may a direct or indirect translation of Asset loss to HES consequences, or between discrete categories of HES consequences be inferred.

Consequence Indices	6	5	4	3	2	1
	Incidental	Minor	Moderate	Major	Severe	Catastrophic
Consequence Descriptions	Assets: (Facility Damage, Business Interruption, Loss of Product) Minimal damage. Negligible downtime or asset loss. Costs < \$100,000.	Some asset loss, damage and/or downtime. Costs: \$100,000 to \$1 Million.	Serious asset loss, damage to facility and/or downtime. Costs of \$1-10 Million.	Major asset loss, damage to facility and/or downtime. Cost > \$10 Million but < \$100 Million.	Severe asset loss or damage to facility. Significant downtime, with appreciable economic impact. Cost > \$100MM but < \$1 billion.	Total destruction, damage, permanent loss of production. Costs > \$1 billion.

This matrix is endorsed for use across the Company.

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APPENDIX IV PROCESS HAZARDS ANALYSIS

Consequence Index for City of Richmond Industrial Safety Ordinance

To be used in conjunction with Chevron Integrated Risk Prioritization Matrix

Incidental (6)	Minor (5)	Moderate (4)	Major (3)	Severe (2)	Catastrophic (1)
<p>Confirmed off-site odor or noise from facility</p> <p>Excess flaring, fire, smoke, plume visible off-site</p> <p>Spill or release that meets an RQ requirement</p> <p>(Level 1 CWS notification)</p>	<p>Fire, smoke, plume, explosion, noise/pressure wave leaving site</p> <p>Off-site impact to individuals with respiratory sensitivities</p> <p>Requires some formal community notification (Level 2 CWS activation)</p>	<p>Fire, smoke, heat, plume, explosion with impact off-site to the general population</p> <p>Mutual aid is requested</p> <p>Community notification is requested by incident commander (Level 3 CWS activation)</p>	<p>Hospitalization for more than 24 hours of 3 or more persons</p> <p>On-site and off-site property damage greater than \$500,000</p> <p>Flammable vapor cloud of more than 5000 pounds</p> <p>Requires broad community notification (Level 3 CWS activation)</p>	<p>1 – 10 Fatalities</p> <p>Requires broad community notification (Level 3 CWS activation)</p>	<p>> 10 Fatalities</p> <p>Requires broad community notification (Level 3 CWS activation)</p>

Categories 1 and 2 correspond with the Chevron Integrated Risk Prioritization Matrix

CWS = Community Warning System

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APPENDIX V PROCESS HAZARDS ANALYSIS

TEAM QUALIFICATIONS AND EXPERIENCE

Role	Qualifications / Expertise in Facility Being Studied
Facilitator	<ul style="list-style-type: none">Formally trained to facilitate Hazop and What-If.Experience facilitating Hazop and What-If.Formally trained in the revalidation process.
*Operations Rep	<ul style="list-style-type: none">Recent experience in performing routine duties (preference should be given to qualified head operators).Recent experience using operating procedures.Expertise with process control strategies.Long-term process operations experience including start-up and shutdown.Ensure the impacted P&ID's reflect the actual conditions in the plant.
Process Engineering Rep (If Required)	<ul style="list-style-type: none">Recent process chemistry monitoring experience in the process being studied.Ability to easily access historical process operating data.Longer term historical process chemistry in other units.
Designs Engineering Rep	<ul style="list-style-type: none">Recent mechanical design experience in the process being studied.Ability to easily access equipment design data, history, and other related records.Longer term historical process expertise in other units.
Recognized Subject Matter Expert	<ul style="list-style-type: none">Significant experience in processing unit (or type of unit) under evaluation.Outside subject matter experts who can share lessons learned and new technology expertise gleaned from within and outside of the Company.

NOTES:

- Some units, such as utilities, will not require a process engineer.
- The PHA or PHA Revalidation team qualifications may be met with more than one person representing an area of expertise for a given role.

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